American Potato Journal

Volume XII May, 1935 Number 5

SOIL TYPES AS FACTORS IN WIREWORM DISTRIBUTION

HARRY L. GUI

Ohio Agricultural Experiment Station, Wooster, Ohio.

It is a well-known fact that soil conditions have a marked influence upon the distribution of wireworms. This paper is concerned with the distribution of *Agriotes mancus* Say, the predominating species in northeastern Ohio, in relation to a limited number of soil types under different cultural procedures.

Some workers state that heavy, wet, sour soils provide favorable habitats for this species;[1] others state that the important factor is the reaction of the soil; and still others believe it is a moisture relationship that is for the most part responsible for the distribution of the insect.

For 4 years critical studies of wireworm distribution have been made on a small plot of land involving three soil types. For many preceding years, this plot, located on the Northeastern Experiment Farm of the Ohio Agricultural Experiment Station, near Cleveland, Ohio, had been covered with a heavy growth of grass. The area used in these studies was 170 feet by 272 feet in size and was subdivided into 17 plots, each 16 feet by 170 feet, to accommodate a series of six crop rotations. A detailed soil map was prepared by Dr. G. W. Conrey, in charge of the Soil Survey in Ohio. The map is shown in figure 1.

Mahoning silty clay loam, dark phase, occupies the lowest area of the plat; the surface drainage is poor. The Mahoning silty clay loam area has a gently sloping surface. Both areas are underlaid with a com-

[1]Thomas, C. A. 1930. A Review of Research on the Control of Wireworms. Pa. State College Bul. 259.

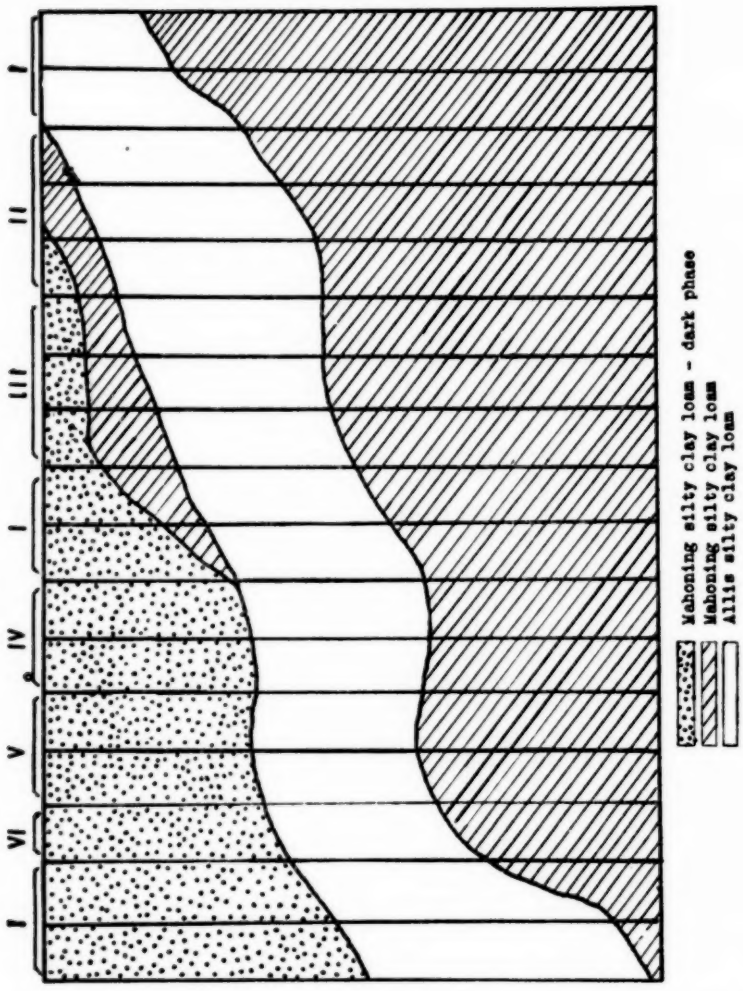

Figure 1. Map of the area studied showing soil distribution and plot arrangement. The Roman numerals indicate the position of the several rotations of the series.

pact, highly impervious subsoil which prevents rapid subdrainage. Probably the greatest difference is in the amount of native organic matter incorporated in the surface layer. Allis silty clay loam occupies a ridge which crosses the area diagonally in a band roughly 70 feet wide. This soil is very deficient in organic matter. It is also typically more acid than the above soils. Its surface drainage is good, due to its position, but its subdrainage is poor. Shale and sandstone are present in the subsoil.

The rotations used in this work are as follows:

*I. Potatoes
Sweet clover (oats)

II. Potatoes
Sweet clover (oats)
Soy beans, rye

III. Potatoes
Mammoth clover (oats)
Soy beans, rye

IV. Potatoes
Sudan grass, rye

V. Potatoes
Buckwheat, rye

VI. Potatoes (continuous)

*See figure 1 for position of rotations in the series.

In order to insure stands of clover, the entire plat was limed in 1930.

Wireworm populations were determined by sifting the soil. Square-yard areas to a depth of 7 inches were used as samples. The place of sampling was determined by three lines lengthwise of the field, so located as to quarter the breadth. Thus, three samples were taken from each plot every year, except those plots in potatoes.

Tuber damage was determined at harvest time. Each of the soil types was taken into account, as well as the different crop rotations in the series.

The data on populations are presented in table 1.

TABLE 1—*Soil type in relation to wireworm abundance.*

Soil Type	Calculated Number per Acre			
	1931	1932	1933	1934
	No.	No.	No.	No.
Mahoning silty clay loam, dark phase	17,279	13,310	14,520	40,520
Mahoning silty clay loam	9,075	7,074	24,684	28,684
Allis silty clay loam	4,211	1,210	3,025	5,808

Although the ratio of distribution in the three soil types fluctuated somewhat from year to year, the populations, with one exception, held the same position in relation to each type. In 1933, the population of Mahoning silty clay loam exceeded that of its dark phase.

The same relationship as to soil type was found to exist when each crop rotation was considered. This was to be expected because each of the rotations was represented in at least two and sometimes all three

soil types. The detailed data in table 2 are presented to show that the relationship holds true.

TABLE 2—*The distribution of wireworms under different rotation systems.*

Rotation No.	Year	Wireworms per Acre		
		Mahoning Silty Clay Loam, Dark Phase	Mahoning Silty Clay Loam	Allis Silty Clay Loam
		No.	No.	No.
I	1931	13,520	10,890	1,597
	1932	7,293	4,840	3,630
	1933	13,520	14,730	0
	1934	36,720	32,428	5,260
II	1931	—	10,454	3,243
	1932	—	9,680	3,630
	1933	—	29,040	0
	1934	—	32,428	0
III	1931	—	7,260	8,083
	1932	—	13,520	2,420
	1933	—	36,300	3,025
	1934	—	43,560	4,840
IV	1931	19,360	15,940	2,420
	1932	9,680	9,680	0
	1933	0	24,200	0
	1934	36,720	24,200	0
V	1931	19,360	11,100	9,680
	1932	19,360	0	0
	1933	14,520	4,840	0
	1934	29,040	4,840	4,840

If it is true that populations are distributed according to soil type, it should also be true that the degree of tuber damage would be more severe in the soils harboring the greatest population. It must be borne in mind, however, that wireworms can, and evidently do, migrate from tuber to tuber in the soil and that a single wireworm may damage several tubers or several wireworms may feed upon a single tuber. The result should be that tubers grown in soils with a high population would be more severely damaged than those grown in soils harboring small populations. It would not necessarily follow, however, that the percentage of tubers grown under each condition should be injured in direct proportion to the population.

In collecting damage data, any tubers bearing wireworm injury, regardless of the severity, were classed as injured. When the data shown in table 3 are compared with table 1, it will be seen that wireworm populations and tuber damage do not correlate precisely but that there is a distinct relationship.

TABLE 3—*Relation between soil type and potatoes injured by wireworms.*

Soil Type	Tubers Injured by Wireworms			
	1931	1932	1933	1934
	Per cent	Per cent	Per cent	Per cent
Mahoning silty clay loam, dark phase	33.5	17.3	37.0	38.5
Mahoning silty clay loam	2.1	8.9	62.7	23.6
Allis silty clay loam	1.8	2.9	19.1	17.5

Less consistent differences were obtained from the data on damage under the various crop rotations. The general layout of plots prevented replication of samples, which was possible when population data were taken. With the exception of rotation 1, single samples were taken from each soil type every year, and, therefore, the data cannot be considered as significant or even an indication of the true state of conditions. These data suggest, however, that a gross agreement exists between populations and damage even in the absence of adequate sampling. Table 4 gives the results of damage counts for the 3 years in which they were made.

TABLE 4—*Degree of wireworm injury to potatoes under various crop rotations.*

Rotation No.	Year	Damage to Potatoes		
		Mahoning Silty Clay Loam, Dark Phase	Mahoning Silty Clay Loam	Allis Silty Clay Loam
		Per cent	Per cent	Per cent
I	1932	26	11	14
	1933	66	21	20
	1934	37	22	9
II	1932	—	8	1
	1933	—	55	5
	1934	27	22	8
III	1932	—	18	2
	1933	58	58	17
	1934	32	20	15
IV	1932	7	3	4
	1933	87	80	54
	1934	49	47	21
V	1932	16	1	6
	1933	51	10	13
	1934	36	10	22
VI	1932	22	4	4
	1933	56	4	17
	1934	42	12	10

It has been stated that acid soils provide a more suitable habitat for *Agriotes mancus* than soils with a high pH value.

In the present investigation, Mahoning silty clay loam, dark phase, has harbored the greatest population; yet the average reaction of four samples taken in 1934 was pH 5.29. Mahoning silty clay loam, with the highest pH value of 5.69, had an intermediate population, and Allis silty clay loam, with a reaction of pH 4.41, had the smallest population. It appears, therefore, that within a narrow range of pH values this factor played a small part in determining wireworm distribution.

It has also been stated that soil moisture is important in determining the abundance of wireworms in the soil. The deficiencies in rainfall in the Cleveland area for 5 years are as follows: 1930, 8.94 inches; 1931, 4.48 inches; 1932, 0.62 inches; 1933, 9.65 inches; and for the first nine months of 1934, 8.38 inches. By comparing the population data given in table 1 with the deficiencies in rainfall, it will be noted that wireworm abundance was greater in the years following those of most severe drought than in years following those in which there was a more nearly normal precipitation. It is true that soils having the highest water-holding capacity were more heavily infested than others, but this fact does not explain the increase in population following drought conditions and the general increases as the drought period was prolonged.

The organic content of Mahoning silty clay loam, dark phase, was greater than that of the other soils under observation, and it also harbored the densest wireworm population. Mahoning silty clay loam held an intermediate position in respect to both factors. Allis silty clay loam, which was most deficient in organic matter, was the most lightly infested. This indicates a direct relationship between wireworm populations and the organic content of the soil. However, this statement has certain unknown limitations since the muck soils of Ohio are not infested with *Agriotes mancus*. Therefore, in the final analysis, the rôle of soil organic matter in determining wireworms distribution is still unkonwn.

Summary

In summarizing, it can be said that, in northeastern Ohio during the years of 1931 to 1934, the soil reaction within narrow limits was not an important factor in determining the local distribution of *Agriotes mancus* Say.

Although soil moisture may be an important factor, drought con-

ditions have not reduced the degree of infestation, but, instead, a marked increase in population was noted after seasons of the most extreme drought and after a drought period of 4 years.

A series of six different crop rotations has not brought about a redistribution of the insect under observation.

The organic matter content of the soils studied at the Northeastern Experiment Farm has held a positive relationship with wireworm populations and tuber damage.

From the data thus far obtained it appears that none of the individual factors hitherto given credit for controlling wireworm distribution is alone responsible and that the distribution is governed by a complex of these factors and others which can best be described by the term "soil type."

THE REASON FOR GIVING CERTIFICATION TO SMALL-SIZED SEED POTATOES AND THE ADVANTAGE OF PLANTING "WHOLE SEED" RATHER THAN "CUT SEED," IN SOME LOCALITIES

H. S. MAC LEOD

District Inspector, Dominion Laboratory of Plant Pathology, Saanichton, B. C.

During the past several years, the potato growers in the Fraser Valley, in the Province of British Columbia, have claimed that when cut seed is used in planting the potato crop there are heavy losses caused by the seed pieces rotting in the ground. In many instances the seed pieces rot before they germinate, or before the plants appear above the ground, thus causing many "misses" in the crop. In other instances the seed pieces partly decay and produce plants that are very low in vitality and give very poor yields. The same statements were made by other potato growers farming in low-lying soils in other parts of this province.

This rotting of the cut seed pieces in the soil may be due to one or more of several factors. The soils in which this rotting of the cut seed pieces occurs are mostly of alluvial deposit, and in many instances retain much moisture quite late in the spring. If heavy rains come after planting, much of the cut seed is very liable to break down and rot. Also many of the soils on the flats are quite shallow, with a hard pan at a very short distance below the depth of planting the seed, thus preventing sub-irrigation. Consequently, under such conditions, the soils sometime dry out too much and become too warm, thereby caus-

ing the cut seed pieces to "sweat" and rot, or dry up and fail to germinate. In many instances of such rotted seed pieces obtained from several localities, the organism *Pythium ultimum*, Kühn, was isolated and has been reported previously by W. Jones of the Dominion Laboratory of Plant Pathology, Saanichton, British Columbia.

Most of the growers of table stock potatoes in those localities, affected by this rotting of the seed, follow the practice of planting "whole seed" rather than "cut seed." For seed they use the small potatoes from their crops, generally those from 1½ ozs. to 3 ozs. in size, and plant without cutting.

After having followed this practice of using for seed those small potatoes from their commercial crops for a number of years, most of those growers found that their crops were gradually, but steadily, decreasing in yield of marketable potatoes per acre. They claimed that their crops were "running out." Our inspection of such crops revealed the fact that such decrease in yield and the so-called "running out" of the seed was because of the fact that they were affected rather badly with virous diseases, including mosaic, leaf roll, giant hill and spindle tuber. It was explained to those growers that by using the seed from such diseased crops, they were increasing the amount of these diseases each year, especially because they used the small potatoes for seed. It was pointed out that a large percentage of the potatoes from plants affected with virous diseases, especially with mosaic, leaf roll or spindle tuber, were small in size and many of them would come within the size of seed desired for planting whole. Therefore, it was quite obvious to those growers that by using for seed the "bin run" of those small potatoes from crops that were affected with virous diseases they were greatly increasing such diseases and thus causing their crops to decrease in yield of marketable potatoes. This decrease in yield per acre considerably lowered the revenue from those crops and in many instances made it unprofitable to produce potatoes on those farms.

The growers concerned were then advised to purchase their seed from certified seed crops and thus obtain seed that was relatively free from virous and other diseases. Many of them did this and secured very satisfactory results in most cases. However, at that time there was no official recognition given to a small sized grade of seed from certified crops, and the purchaser was not always sure that the seed he received was from certified crops. Hence,

in some cases there was considerable disappointment in this respect.

It should be mentioned here that the Seed Potato Certification work in Canada is conducted under the direction of the Dominion Botanist, Dominion Department of Agriculture, and the regulations governing the production of this seed and also the standards for those crops and for the grade of Canadian Certified Seed are uniform in all the provinces of Canada. It is considered that this Dominion-wide uniformity in regulations, standards and grades gives greater satisfaction than if each province were conducting this work independently of the others.

During the first fifteen years of the Seed Potato Certification work in Canada, that is previous to 1929, there was only the one grade of certified seed, so far as size of tubers was concerned. The size allowed was 2 ounces to 12 ounces in weight. This grade was, of course, too large for planting whole. Therefore, those growers who desired to plant the "whole seed" found it impossible to obtain a suitable grade of small sized certified seed.

In the year 1926, those potato growers in the Province of British Columbia who desired to plant "whole seed" rather than "cut seed," for the reasons above mentioned, requested the Dominion Botanist to grant certification to the small potatoes from crops that passed inspections for certification. The Department did not wish to grant this until it would be definitely proved by experiment that the small potatoes would give better results than the ordinary-sized grade then obtainable as certified seed, from the same crops, especially as experiments conducted previously had proved that virous diseases increase more rapidly by planting small potatoes from the average certified crop than by planting the ordinary-sized certified seed from the same crop. However, after this request was made more urgently in 1927 by the Certified Seed Growers' Association of British Columbia, the Dominion Botanist instructed the certification officials who were working under his direction in this province to conduct experiments in the localities concerned to determine the extent of the loss caused by the cut seed rotting in the ground. The first of those experiments was conducted in 1928 on a heavy silt soil in one of the districts from which such complaint had been received.

In that experiment in 1928, the variety used as seed was Early Rose, from a certified seed crop. For both the whole and the cut seed the weight of each seed piece was three ounces. The experi-

ment was planted in triplicate and all the seed was planted, by hand, on the same date and in adjacent rows. It was all given the same treatment, the same cultivation, and the experiment was dug on the same date. All conditions were as uniform as it was possible to obtain. The early part of the growing season was unusually wet and 24 per cent of the cut seed rotted as compared with 2 per cent for the whole seed. The yields from the experiment are shown in table 1.

These results were very emphatic evidence that those growers in British Columbia were correct in maintaining that under certain conditions of soil it is not profitable to plant cut seed. With such splendid yields obtained from the whole seed as compared to the yields from the cut seed in this experiment it gave quite strong support to the growers in their request for the certification of small seed potatoes.

The same experiment was repeated in 1929 on a peaty loam soil in another district from which complaints had been received regarding cut seed rotting in the ground. The variety used here was Irish Cobbler from a certified seed crop. As in the previous year's experiment, all conditions such as size of seed piece, seed treatment, soil, planting, cultivation and harvesting were as uniform as could possibly be obtained. Only 2 per cent of the hills were missing on the plots planted with whole seed as compared with 10 per cent for the cut seed. In addition, 5 per cent of these plants were recorded as weak.

The difference in yields from the whole seed and from the cut seed was not so great in 1929 as it was in this experiment in 1928. This was owing to the fact that in 1928 the conditions of the heavy silt soil were less favorable to cut seed than those of the peaty loam soil in 1929. However, a difference of over two tons per acre in favor of the whole seed quite often means the difference between profit and loss to the average grower of potatoes.

These two years' experiments under different types of soils and different conditions for growth, showed the advantage of planting whole seed rather than cut seed in these two districts, which are quite representative of a considerable portion of the potato growing area in British Columbia. This further supported the growers in their request for the certification of small seed potatoes. This request was granted by the Dominion Department of Agriculture in the year 1929. Since that time this small certified seed (size 1½ oz. to 3 oz. in weight) has been used each year by the growers of table stock potatoes in those lo-

calities, and the results are very satisfactory in giving higher yields and better quality potatoes then the seed used in former years. However, it was observed in these experiments that the percentage of various diseases was higher in the crops grown from whole seed than those grown from cut seed taken from the Extra No. 1 grade (size 3 oz. to 12 oz. in weight). This agreed with the observations from similar experiments conducted in other places. Therefore, this small sized grade of certified seed potatoes is suitable only for commercial table stock production and is not recomemnded for the production of certified seed crops. Words to this effect are printed on the official certification tags for this grade. However, in those localities where the whole seed is found to be more satisfactory than the cut seed, for the reasons given above, the commercial growers of table stock potatoes will pay a higher price for the small sized grade than they will for the Extra No. 1 grade.

In order to get more information regarding the comparative yields of crops planted with "whole seed" and those planted with "cut seed," this same experiment was continued for two more years. The results of the four years' yields in this experiment are summarized in table 1.

TABLE 1—*Influence of whole and cut seed on yield*

Year	Location	Soil Type	Variety	Yield in Tons per Acre					
				Kind of Seed Piece Cut			Whole		
				Marketable	Culls	Tot.	Marketable	Culls	Tot.
1928	Sumas	Heavy Silt	Early Rose	3.9	0.7	4.6	11.5	3.7	15.2
1929	Lulu Island	Peaty Loam	Irish Cobbler	6.2	1.6	7.8	8.3	1.9	10.2
1930	" "	Medium Loam	"	5.0	2.0	7.0	6.4	2.2	8.6
1931	" "	"	Green Mts.	7.9	2.2	10.1	9.2	2.1	11.3
Av.				5.7	1.6	7.3	8.8	2.5	11.3

In these experiments it will be observed that, under the conditions in those localities, higher yields per acre were obtained each year from "whole seed" than from "cut seed." The difference

varied according to the moisture content and the temperature of the soil. The experiment shows that for the four year average the whole seed gave 3.1 tons of marketable potatoes, and 4 tons of total crop, per acre more than the cut seed. This indicates very strongly that on such soils and under such conditions the growers of table stock potatoes should use whole seed rather than cut seed in planting their crop, providing they can obtain small seed that is relatively free from virous and other diseases.

SEED VALUE OF POTATOES GROWN IN DIFFERENT CROP ROTATIONS WITH IRRIGATION

H. O. WERNER[1]

University of Nebraska, Lincoln, Nebraska

Some potato growers are of the opinion that potatoes produced on rank, vigorously-growing plants are not so desirable for seed purposes as are those grown under conditions less favorable for vegetative growth. Therefore such growers look with disfavor upon the use of irrigated potatoes, at least potatoes grown with much irrigation water—or those grown on a very heavily fertilized field. They claim that adverse conditions, even to the extent of approaching starvation,—as in the case of a deficiency of some element or drought,—is favorable for the production of good seed potatoes. Undoubtedly such opinions are valid when virous diseases are present, because of differences in susceptibility and rate of spread, but their validity is to be questioned when healthy seed potatoes are used.

Tubers produced in different environments differ considerably in their chemical composition. The nature of these differences may partially depend upon such contributing factors as variation in maturity and size of tubers, which are, however, also a result of the environment. Different degrees of productivity might be expected when such tubers are planted. Much of the earlier work along this line is rendered valueless because of the virous disease factor. In some relatively recent work virous diseases are reported to have been eliminated so that they need not be considered at all. From this later work there is some indication that differences in the environment in which tubers are produced may result in differences in productivity of such potatoes when they are planted. These differences are, however, relatively

---

[1] Published with the authorization of the director as Paper 161 of the Journal Series of the Nebraska Agricultural Experiment Station.

small when compared with those experienced when seed stocks infected with virous diseases were grown in different environments.

Hardenburg (1925) concluded that there was some indication that tubers produced on well-aerated soils were superior for seed purposes to those produced on heavier soils and that the prejudice against seed potatoes grown on muck soils was unwarranted. Virous diseases were not a factor in his tests.

Werner (1929) was unable to detect any significant differences in the productivity of seed potatoes produced in soils varying in sand content or in percentage of manure. Werner (1929, 1935) also reported that western-grown seed stocks free from virous diseases were about equally productive whether produced on dry land or with irrigation.

Using vigor of sprout growth as an index of seed vigor, Krüger (1927) reported that the addition of N to poor sandy soils improved the seed value of the tubers produced, but that on heavier soils it reduced the seed value of the tubers. He also reported that tubers produced when ammonium sulphate was supplied had a higher seed value than those from plats receiving calcium or sodium nitrate. He attached significance to the correlation between high vigor of sprout growth and an increase in amino-acid content of tubers during storage and vice versa. His results would be of greater significance if one could be certain that he was not measuring the effect of various environmental conditions upon the spread of virous diseases.

Butler and Murray (1932) grew healthy potatoes in the greenhouse at 15 and 20° C between late January and May with and without the addition of 2 parts of KNO_3 per thousand of air dry soil. Such treatment increased the yield 33.5 per cent at 15° C. and 18.7 per cent at 20° C. When seed potatoes grown under these four sets of conditions were planted at both temperatures, the potatoes from nitrate-fertilized plants produced less than those from unfertilized plants. With potatoes infected with leaf-roll the decrease in productivity of nitrate-fertilized seed was much greater than with healthy stock.

Berkner and Schlimm (1933) reported highest yields from seed potatoes grown either without any K fertilizer or from those grown with potassium sulphate whereas those grown with kainit were least productive. They also reported that when potassium fertilizers were applied at blooming time the tubers were more productive the following year than when it was applied at planting time. The potatoes pro-

duced on land receiving large amounts of nitrogen (4 and 6 dz/ha) were more productive the following year than those receiving a smaller quantity (2 dz/ha).

Difficulties in Determining Differences in Seed Value

In endeavoring to determine differences in productivity of tubers produced in two or more environments a number of factors must be considered. The environments are very likely to cause differences in the degree of maturity of the tubers because of differences in the time tubers are set, in the rate or time of their development or because of plants maturing at different times, or attaining different degrees of maturity when the tubers are harvested. The degree of maturity exerts considerable control over the length of the rest period. Consequently a trial plat planted in the south in January might not give the same results as one planted in the north in April; and one planted in June might be still different. The differences in yields secured in these cases might simply be a measurement of the differences in the rest period of the tubers.

Different environments or treatments very commonly cause differences in the size of the tubers. This then means that, if random samples are taken for planting, even weight seed pieces cut for planting will vary in the area of the cut surface and the number of eyes per seed piece. The first of these has a bearing upon the amount of seed piece rotting, the promptness of growth (earlier than with less cutting) and the stand of plants. Variation in number of eyes per seed piece will to a slight extent influence the number of stems and number of tubers. Sometimes these variations may cause the plants of one series to be subjected to the most favorable portion of the growing season at a time when the plants are more advanced and better able to benefit by it than are those of another series in the same trial, while at other times the situation may be reversed.

Experimental

A very good opportunity for testing the seed value of potatoes grown in fields of different degrees of fertility and producing great extremes of vine growth and yields was available in connection with the rotation plots of the Scottsbluff Experimental Farm which have been in operation for 25 years. These rotations varied in length from one to seven years. The fertility and physical condition of the soil was altered by the use of manure or alfalfa on some of the plats. The

vine growth varied from plants only about 12 inches tall in the continuous plat, to a complete covering of the ground to a depth of three feet in the case of the longer rotations that include alfalfa. The differences in yield were to a considerable degree proportional to the differences in vine growth (for report of yields, etc., see Scofield & Holden 1927).

Triumph potatoes free from virous diseases and from the same tuber line were planted in all these plats on the same day and all later operations were carried out on the same day. Samples for planting were taken from eight selected plats by selecting tubers of as nearly the same size as possible in each of the various plats. These were stored in crates in the same cellar. The comparative trials were conducted on the same farm on land which had been in alfalfa and which was irrigated as needed. Each lot of seed was planted in 12 single row plats of 50 hills each. They were arranged in several tiers in a Latin square order. The plats were planted in mid June and harvested in early October.

TABLE 1—*Total yield from seed potatoes from various crop rotation plats when planted in comparative irrigated plats—during each of three successive seasons.*

No.	Rotation	Total Yield in Bushels per Acre 1930	1931	1932
4	P 1*	405.5± 7.05	637.9±12.5	195.1± 8.2
20	B-P	397.0± 6.00	598.3±26.2	137.5± 6.6
21	B(M) 2* P	437.0± 7.5	613.2±20.7	187.8± 9.9
30	O-B-P	374.5± 7.8	544.0±28.3	163.1±15.9
31	O-B(M) 2*-P	419.0± 8.80	589.0±21.8	142.8±13.4
40	B-A-A-P	422.5±10.4	683.4±29.5	209.1± 9.4
60	O-B-A-A-A-P	430.0±12.7	667.5±32.4	202.3± 9.9
61	O-B(M) 2* A-A-A-P	449.0±17.6	664.5±38.4	204.3± 5.2
	Dry land grown check	400.3± 7.1	596.8±12.0	
	Mean of yields from eight irrigated plats	416.8	624.7	180.2

1* Crops arranged in order of their sequence: P—potatoes; B—sugar beets; A—alfalfa; O-oats.

2* (M) Manure applied ahead of beets.

These treatments caused a difference in time of maturity of vines which could not be avoided. During the very unusual season of 1929 a freeze on the 6th to 9th of September killed the vines to the ground. At this time the vines in the short rotation plats were mature but the others were still very green. In 1930 and 1931

growing seasons were long and the vines of the plants in long rotations almost attained maturity by harvest time.

There was relatively little difference in the total yield produced by the various lots of seed potatoes and most of these were not statistically significant. However, as the differences were in the same general direction they might be considered as having some practical significance.

The yields from the seed potatoes from the four- and six-year rotations were quite consistently higher than those from the three-year rotations. The potatoes from the three-year rotations were generally not more productive than those from the two-year or continuous potato rotations. Potatoes from the manured plats always outyielded those from comparable unmanured two-year rotations, as they also did in two out of the three years with the three- and six-year rotations. In 1930 and 1931 the dry land checks were outyielded by most of the irrigated lots, the average yield of all the latter exceeding the dry land lots by 4.2 per cent in 1930 and 4.7 per cent in 1931.

The yield differences are perhaps more apparent when reduced to a percentage basis, calculating all yields as percentages of that

TABLE 2—*Mean total yield during three years by seed potatoes from various crop rotation plats, presented as percentages of the mean yield by the potatoes from the six year manured crop rotation (for yield of which see table* 1).

Rotation		Years of Comparative Trials			Mean of Percentages for Three Yrs.
No.	Crop Sequence	1930	1931	1932	
4	P	90.32	96.00	95.47	93.93
20	B-P	88.42	90.02	67.30	81.91
21	B(M) P	97.33	92.28	91.93	93.85
30	O-B-P	83.42	81.90	79.86	81.73
31	O-B (M) P	93.33	88.65	69.90	83.96
40	B-A-A-P	94.10	102.85	102.38	99.78
60	O-B-A-A-A-P	95.77	100.45	99.05	98.42
61	O-B (M) A-A-A-P	100.00	100.00	100.00	100.00
	Dry land check	89.13	89.80		

from the seed from the six-year manured rotation (rotation 61). The three-year averages suggest that superior yields were procured from the four- and six-year rotation and from rotations to which manure was added. However, the potatoes from the con-

tinuous rotation plat averaged more productive than those from the two- and three-year plats.

The percentage of U. S. No. 1 grade potatoes was generally higher in the crop from the long than from the short rotations. Manuring the previous year did not exert a consistent influence on the grade the following year. The dry land stock produced a lower percentage of No. 1 size tubers than the irrigated stocks. The high percentage of No. 1 tubers in some lots may be due to the fewer number of eyes per seed piece cut from the slightly larger tubers of irrigated lots. Fewer stems and fewer tubers, which would develop more size, would be the logical result.

Composition of Tubers Grown in Three Rotations

Analysis made for total nitrogen, total sugar and acid hydrolyzable polysaccharides reveal a tendency toward a slightly higher percentage of nitrogen in the potatoes from long rotations containing alfalfa, than in those from the two-year rotation containing corn as the other crop. The potatoes from these less productive short rotations had a higher percentage of acid hydrolyzable polysaccharides than did those from the other rotations. The com-

TABLE 3—*Chemical analysis of potatoes grown in rotation plats at Scottsbluff in* 1930. *Analysis made in March* 1931.

Rotation No.	Crop Sequence in Years Prior to Potatoes	Dry Weight	Total Nitrogen		Soluble Sugar		Acid hydrolyzable polysaccharides	
			In Fresh Wt.	In Dry Wt.	In Fresh Wt.	In Dry Wt.	In Fresh Wt.	In Dry Wt.
			Large Tubers (7-9 oz.)					
60	O-B-A-A-A-P	14.1	.3392	2.40	.17	1.2	8.05	57.1
40	B-A-A-P	14.5	.3471	2.40	.33	2.3	8.51	58.7
26	C-P	14.3	.312	2.175	.21	1.5	9.12	63.1
Dry land		17.9	.3694	2.063	.81	4.5	10.74	60.0
			Small Tubers (2-3 oz.)					
60	B-G-A-A-A-P	16.3	.440	2.704	.67	4.1	9.45	58.0
40	B-A-A-P	14.9	.3695	2.480	.31	2.1	8.55	57.4
26	C-P	16.2	.3055	1.888	.31	1.9	10.23	63.2

position of dry land grown potatoes was similar to that of the potatoes from the short rotations. The higher N content of the long rotation potatoes is of interest in connection with the fact that when uniformly-sized seed pieces from the several plats were planted in sand in a warm cellar the weight of sprouts produced was greatest

with these potatoes. The potatoes from manured rotations produced heavier sprouts than those from plats grown without manure.

Discussion

Were it not for the relatively high productivity of the potatoes from the continuous potato rotation one might be warranted in concluding from these data that the long rotations with their vigorous growth and high yields of potatoes, due to alfalfa, also produced more productive seed potatoes. Our data do not permit of the complete acceptance of such a conclusion. However, they do suggest that crop conditions which favor high yields, as does irrigation, combined with these long rotations and manuring, do *not* impair the value of the tubers for seed potatoes. These data are based on seed stocks free from virous diseases and practically free from other diseases except scab. If some of these diseases were present—especially virous diseases, the results would be very different judging from previous experiments on this farm and elsewhere.

Conclusion

This experiment appears to warrant the conclusion that potatoes grown in a highly productive irrigated field are entirely satisfactory for seed purposes, providing, of course, that disease-free seed stock is used.

LITERATURE CITED

Berkner, F. and Schlimm, W. 1933. Die Veränderungen der wertgebenden Bestandteile in der Kartoffelknolle während der Uberwinterung in ihrer Beziehung zu den Erträgen und zur Höhe und Art der vorjährigen Kaligable und Höhe der vorjahrigen Stickstoffdungung. Land. Jahr. 77. 113-155.

Butler, O. and Murray, H. L. 1932. Effect of nitrate of potash on the vigor and productivity of healthy and leaf roll Green Mountain potato plants and their progenies. Jour. Amer. Soc. Agron. 24:881-887.

Hardenburg, E. V. 1925. The influence of soil type on seed potatoes. Potato News Bulletin 2: 464-466.

Kruger, K. 1927. The effect of nitrogen containing fertilizers on the growth, composition and seed value of the potatoes when four different soils were used. (Title trans.) Land. Jahr. 66: 781-841.

Scofield, Carl S. and Holden, James A. 1927. Irrigated crop rotations in western Nebraska. U. S. D. A. Tech. Bul. 2.

Werner, H O. 1929. Relative productivity of seed potatoes grown under various controlled environmental conditions. Jour. Agr. Res. 38: 405-410.

Werner, H. O. 1929. Some facts concerning the productivity of irrigated seed potatoes. Proc. 16th Ann. Meeting, Potato Assoc. of America. Pp. 120-132.

Werner, H. O. 1935. Is there any difference in the productivity of dry land and irrigated seed potatoes? American Potato Journal 10: 64-67.

RELATION OF QUALITY TO PRICE OF LONG ISLAND POTATOES*

M. S. PARSONS

Graduate Assistant in Agricultural Prices and Statistics, Cornell University, Ithaca, N. Y.

Under the abnormally low level of potato prices that has prevailed this season, ordinary variations in quality appear to have only a slight effect on price. Such are the conclusions that may be drawn from a study recently made in New York City.

The purpose of this study was to obtain facts as to the relation of quality of potatoes to prices. It is felt that such information is important as a basis for improvement of grades. The procedure followed was to examine different lots of potatoes on the New York City wholesale markets. The sales prices, together with quality factors such as size, defects, and color, were recorded for each lot.

Samples were examined on the Wallabout Farmers' Market and on wholesaler dealers' markets. Since the price-quality relations were practically the same for both groups, only the farmers' records, of which there were a larger number, are included here. The study was confined to "first grade" potatoes which correspond roughly to the official grade, U. S. No. 1. Most of these potatoes met the U. S. No. 1 requirements for size but often failed to meet the requirements as to defects.

There was considerable variation in size of potatoes. When the records were divided into three groups on the basis of the percentage of potatoes below 2¼ inches in diameter, it was found that the price per barrel decreased from $1.46 to $1.42 as the percentage of potatoes below 2¼ inches in diameter increased from 4.7 to 17.5 (table 1). Conversely, there was a small premium for large size. As the percentage of 3-inch potatoes increased, the price also increased slightly.

At the time when the information was gathered, "seconds," which were usually all below 2¼ inches in diameter, but otherwise of good quality, were selling at about $0.65 per barrel.

---

*Acknowledgment is due the Bureau of Markets of the New York State Department of Agriculture and Markets, to the New York City Department of Public Markets, and to dealers and farmers for their cooperation in this study.

TABLE 1—*Relation of size to price of potatoes.*

Long Island Irish Cobblers sold on the Wallabout Farmers' Market, Brooklyn, New York, August and September, 1934.

Per cent of Potatoes below 2¼ Inches in Diameter	Number of Records	Average per cent below 2¼ inches in Diameter	Average per cent 3 Inches and over in Diameter	Average Price per Barrel
Less than 8.0	45	4.7	32.9	$1.46
8.0—11.9	45	9.8	27.0	1.43
12.0 and over	39	17.5	17.2	1.42
Total or average	129	10.3	26.1	$1.43

There was also considerable variation in the proportion of potatoes having defects. However, the effect on price was small. An increase from 3.5 to 9.6 in the percentage of potatoes having defects was accompanied by a price decrease from $1.44 to $1.41 per barrel (table 2).

TABLE 2—*Relation of defects to price of potatoes.*

Long Island Irish Cobblers sold on the Wallabout Farmer's Market, Brooklyn, New York, during August and September, 1934.

Per cent of Potatoes with Defects*	Number of Records	Average per cent of Potatoes with Defects*	Average Price per Barrel
Less than 6.0	88	3.5	$1.44
6.0 and over	41	9.6	1.41
Total or average	129	5.4	$1.43

*Includes both grade and minor defects, the majority being grade defects, however.

Size and defects appeared to have some joint relationship to price. In other words, the effect of size on price varied somewhat with the amount of defects present. When the percentage of potatoes having defects was below 6, the price decreased from $1.48 to $1.42 per barrel as the percentage of potatoes below 2¼ inches in diameter increased. When the percentage of potatoes having defects was above 6, however, an increase in the percentage of small potatoes had practically no effect on price (table 3).

TABLE 3—*Relation of size and defects to price of potatoes.*

Long Island Irish Cobblers sold on the Wallabout Farmers' Market, Brooklyn, New York, during August and September, 1934.

Per cent of Potatoes below 2¼ Inches in Diameter	Per cent of Potatoes with Defects		
	Less than 6.0	6.0 and over	Average
	Price per barrel	Price per barrel	Price per barrel
Less than 8.0	$1.48	$1.41	$1.46
8.0—11.9	1.43	1.42	143
12.0 and over	1.42	1.42*	1.42
Average	$1.44	$1.41	$1.43

*11 records in this group; 14 or more in all the others.

Likewise, the effect of defects on price was much greater when the percentage of small potatoes was low than when it was high.

Most of the potatoes examined were classified either as "fairly bright" or "slightly dull" in color. There was no difference between the average prices of these two classes. A few lots were classified as "bright" and a few as "dull." There was a small premium for the former class and a discount for the latter (table 4).

TABLE 4—*Relation of color to price of potatoes.*

Long Island Irish Cobblers sold on the Wallabout Farmers' Market, Brooklyn, New York, during August and September, 1934.

Color	Number of Records	Average Price per Barrel
Bright	7	$1.46
Fairly bright	54	1.44
Slightly dull	58	1.44
Dull	7	1.41
Total or average	126	$1.44

During the period when the information for this study was gathered, potato prices were at a very low level. Wholesale prices in New York City were about 23 per cent below 1910-14 average. Under higher price conditions, larger premiums for quality might be expected.

SECTIONAL NOTES

CALIFORNIA

The potatoes in the Shafter district of California are growing very nicely and carloads from this district will start moving between the 20th of May and the 1st of June. This is about thirty days later than the previous two years. At the present time the crop is estimated between 5,000 and 5,550 cars. Quality will be very good and there will be no difficulty in grading them U. S. No. 1. These potatoes will undoubtedly receive a widespread distribution if freight rates do not materially interfere.

The early crop in the Colma district, adjacent to San Francisco, is now moving in a small way, but as the yields of this crop are not heavy they present no particular difficulties.

By the 1st of May about half the acreage in the Stockton district was planted, the remaining half, making a total of about 13,000 acres will be planted as early as possible, about the middle of May. The potatoes that are above ground now look very good, as the weather conditions have been very favorable. A much better grade of seed has been used in the Stockton district this year, and as the acreage is about the same as last year, the better seed should make a total production in excess of that harvested in 1934.

The information available in the United States concerning proposed plantings and crops already harvested clearly indicate that unless there is some sort of serious climatic disturbance the outlook for potatoes in 1935 is very gloomy. The probabilities are that we will have a crop between 375 and 400 million bushels and these potatoes will have to be sold without any control. This means another year of 10, 15, and 20 cent per bushel potatoes.

One wonders how long the potato producers in the United States are going to continue to operate without a reasonable and efficient method of control which will prevent such prices as these. It would be a very simple matter to assure every potato producer in the United States a price of sixty to seventy cents a bushel without hurting any producer in any way, and without jeopardizing the interest of the consumers.

Please write to Mr. H. B. Tabb, Secretary of the National Potato Institute, giving him your suggestions as to what procedure should be taken in order to secure potato control. The growers who are in favor of this must get together and decide on a plan and then get behind it. (May 10).—H. G. ZUCKERMAN.

COLORADO

The outlook for potato production in Colorado has changed very materially during the last month. The 4-year drought seems to have been broken at last and heavy precipitation has been general throughout the state. Growers are much more optimistic than they were two weeks ago. In addition to this, the Federal seed loans have been made available and purchases of seed have been very large during the last two weeks.

There is a possibility now that the potato acreage may be increased because of failure to plant many early crops on account of unfavorable soil and weather conditions.

Applications for certification have started to come in and there will be at least as large an acreage as there was last year. (May 10).—C. H. METZGER.

INDIANA

Very few early potatoes are above ground in Indiana. A great many of the growers who would ordinarily put out early potatoes have been delayed in planting until about this time. I have seen only a few fields that showed any promise and these have been mostly in the southern part of the state on sandy ground. After the fields have been planted for the early crop, there will be little activity in the state until about the first of June and from then until about the middle of July most of the late potatoes will be planted.

There is quite a scramble now for good certified potatoes either of the White or Russet Rural, or of the Irish Cobbler varieties. Although we warned the growers some time ago to make their purchases early, we find at this time that there are a number of inquiries and scarcely any place to buy seed. I sometimes feel as if the certified seed growers over the country could do a lot of good advertising and assist the people in experiment station and extension work, if they would, from time to time, send out a news letter, telling what they might have on hand and what might be the price in carload or l. c. l. shipments. Then when we had inquiries from local folks we could send this information to them directly, rather than to delay the letter or information by writing to the growers and then writing to the one who wishes to make the purchase. (May 13).—W. B. WARD.

KANSAS

The planted acreage of potatoes in the Kaw Valley in Kansas

is estimated at approximately 12 per cent less than in 1934. The extreme drought of the past two seasons, which seriously reduced sub-soil moisture, and the low rainfall during February and March, 1935, in the western two-thirds of the Kaw Valley lowered the prospects for a good crop and caused many growers to plant a smaller acreage than they would otherwise have done. The greatest acreage reduction occurred in the western portion of the valley, where the rainfall was lowest.

Weather and soil conditions for field work were ideal at planting time, and practically all the potatoes were planted before April 1. The plants, however, emerged slowly because the month of April was cool, and the crop is about 10 days behind the 1934 crop at the same date. Only one light frost occurred and this did little harm.

Rainfall since the latter part of April has been satisfactory throughout the Kaw Valley potato area, except the western end, and given favorable weather condition from now on, a good potato crop seems probable. (May 10).—O. H. ELMER.

LOUISIANA

We are now in the midst of our harvesting season and so far the prices have been much better than last year. The yields have been good.

The amount of certified seed placed in cold storage this year will be somewhat smaller than last. Last year some No. 1 large potatoes were put in storage to be sold as certified seed; this year only U. S. No. 1 small size will be placed in storage. It is estimated that we will have around fifteen to twenty thousand bags in storage this season.

The Louisiana Potato Association held its annual meeting on April 23. A greater portion of the meeting was given over to the discussion of the proposed Potato Control Act, which discussion was led by Mr. J. G. Harmount, President of the Terrebonne Cooperatives Association. (May 10).—JULIAN C. MILLER.

MASSACHUSETTS

Commercial plantings are well under way. In the early sections planting is nearing completion. The weather has been cold and backward and in late areas of the State, where farmers grow only their own requirements, the crop has not yet been planted. The acreage is likely to be about the same as last year, about 16,000 acres.

A new organization was formed last winter, known as the Massachusetts Potato and Onion Growers' Association, of which C. Belden is president and Professor G. B. Snyder, M.S.C., is secretary. This organization has been active in representing opinions of growers relative to a Potato Control Act. It is sponsoring the state exhibit on potatoes and onions which has been a feature the past two years at the Eastern States Exposition and this year has been enlarged to include other New England states. (May 9).—RALPH W. DONALDSON.

NORTH CAROLINA

The early potatoes in this State have had an exceptionally good season this year. The spring has been cool and is about two weeks earlier than usual. The acreage has been cut about 15 to 20 per cent over last year, but the stand is excellent, and unless something unforeseen happens, we will harvest a big crop. The plants are blooming now and some of our growers expect to begin digging the last week in May. Most of the crop, however, will be ready for harvest early in June. The crop in the mountain section of the State was planted during April. The yield of certified seed potatoes will probably be larger than it was last year, but the crop as a whole will be about the same. (May 8).—ROBERT SCHMIDT.

NORTH DAKOTA

North Dakota growers are now beginning to plant their potatoes. We expect that there will be about the same acreage planted for certification. Last year we put in a little over 10,000 acres, and, because of dry weather, had about a 70 per cent yield. Absolutely everything that was grown from these certified fields has been sold.

We are looking for a bigger yield this year, since our entire state has been well drenched with rain during the last three weeks. (May 10).—E. M. GILLIG.

OHIO

The soil and weather were ideal for planting the crop of Cobbler potatoes. The planting started in southern Ohio in March and the commercial planting of the crop was completed in April. Heavy rains started the first of May which brought the rainfall for

the season almost to normal for the year beginning January 1, 1935. The Cobblers are now coming through the ground and good stands are expected. The planting of the late crop will begin soon.

The acreage in the state will be somewhat smaller than last year. Most of the commercial growers in the state are planting about the same acreage as 1934. Most of the reduction will come from the smaller acreage.

More than 100,000 bushels of potatoes have been graded, packed and sold by the C. and M. Cooperative in northeastern Ohio. While this is not a large volume considering the production in the state, it is a start in the right direction. During the latter part of the season, this cooperative packed potatoes in 15 pound sacks. (May 11).—E. B. Tussing.

PENNSYLVANIA

Growers of certified seed potatoes have had a fairly satisfactory season so far as volume of business is concerned, but the price was naturally more or less disappointing. Many growers were completely sold out while a few others were unable to move very little of their crop for seed purposes. The price generally has been fifty to sixty cents per bushel at the cellar with some selling for as low as forty cents, and others as high as seventy cents.

The demand for seed during the winter and early spring was very poor. During the fore-part of April, orders started coming in quite rapidly and by the end of the month many growers were sold out. In one of our largest seed-growing counties, there is less than a carload of certified seed available at this time.

The new Nittany Cobbler developed by Doctor Nixon has created considerable interest in other states from which requests are being received for potatoes for trial and experimental purposes. The 2,200 bushels of seed of this variety certified in this state last year were sold early last fall.

Planting intentions in most of the seed-growing counties indicate that about the same acreage will be planted this year as was planted in 1934. The few reports received from some of the other counties, principally the southeastern counties, show a slight reduction. The certified seed acreage is expected to be about the same as 1934.

Early-planted potatoes appear to be slow in coming through this spring. While we have had some favorable weather, we have

had several cold, wet periods which did not favor early germination. (May 10).—K. W. LAUER.

SOUTH DAKOTA

At this date practically no potatoes have been planted. One can say, however, that conditions in the potato growing section of South Dakota are exceptionally favorable. The state has been blessed with an unusually large amount of preciptation At Brookings, in the east central part of the state for instance, the rainfall this year up to date is 6.21 inches, as compared with only 2.36 inches for the corresponding date last year. The precipitation record at Brookings is very similar to that of all portions of the eastern portion of the state. Consequently there is an optimistic outlook regarding prospects of not only potatoes but also of a good grain crop. (May 10).—K. H. KLAGES.

TENNESSEE

Rains almost every day from early March until along in April delayed Irish potato planting in Tennessee. Plantings about the middle of April will probably encounter hot weather and give poor yields. (May 8).—BROOKS D. DRAIN.

VIRGINIA

The Eastern Shore evolved a rather elaborate credit program this Spring, under which the various operators who furnish credit or supplies to grow the White Potato crop agreed to limit their credit extension on any given farm to 78 per cent of the acreage grown on that farm in 1934.

This program was carried through in an apparently satisfactory manner. The general concensus of opinion, supported by available data, indicates that the acreage on the Eastern Shore of Virginia has been reduced between 20 and 25 per cent., and possibly even more that that. It was reported that a few potatoes were planted after the better market prospects for 1935 publicized. However, such plantings, if they were made, will probably be very ineffective from a standpoint of increasing production, since history indicates that it is only in very late and cool seasons that such plantings produce a profitable crop of potatoes. We would, therefore, feel very safe in saying that the potato acreage which approximated, in 1934 somewhere between 51,000 and 52,000 acres, has been reduced to approximately between 39,000 and 41,500 acres in 1935.

Even though the season is generally somewhat late, the potatoes seem to have progressed in about the normal way. The Eastern Shore, therefore, may expect to begin its harvest somewhere between the 5th and 10th of June. There is perhaps a wider range in the development of the plantings between lower Northampton and upper Accomack than has been seen for several years. This is a happy condition, as viewed from the standpoint of the Eastern Shore, as it will tend to spread the flow of potatoes more equitably during the Eastern Shore season.

Early in the season rainfall was exceedingly heavy, and a small acreage was lost by drowning. However, this is very small in comparison with last year. There has been sufficient moisture in Accomack County and the northern part of Northampton County, with perhaps a moisture deficiency in the lower half of Northampton County.

There are a few indications that the heavy rains have leached the fertilizer from some of the lighter, higher spots. This condition is apparent in a very small way in lower Northampton, but with rainfall and the availability of nitrogen from the organic fertilizer sources increasing with warmer weather, there may be no particular loss from this cause. In Accomack County the potatoes have not progressed to the point that they show any effect of nutritional conditions.

The American Legion is sponsoring a Potato Blossom Festival on the Eastern Shore of Virginia this year.

The dates of the Festival are May 29th and 30th, and the Festival will be held at the Agricultural Fair Grounds at Keller.

There are indications that the Festival will be attended by representatives from many states and visitors from the markets and potato producing sections. The Eastern Shore extends a very cordial welcome to visitors from all sections of the country. (May 13).—G. S. Ralston.

CANADA

More potatoes than usual have been used for the manufacture of starch this season and more than the usual quantity have been fed to live stock, but it is obvious from a study of the figures released by the Bureau of Statistics that there has been no material reduction in the surplus stocks. The figures show that there were 19,740,000 cwt. in farmers' hands on March 31, 1935 in Canada, compared with 12,634,000 cwt. a year ago.

A study of the potato situation has been undertaken by the National Research Council and a special committee on potato research has been appointed to investigate possibilities for industrial uses of potatoes, etc.

A study of the economics of potato production in the St. John's Valley, New Brunswick, will probably be undertaken this year by the Dominion Agricultural Economics Branch.

According to the figures issued on May 9 by the Dominion Bureau of Statistics, a sharp reduction in potato acreage of 8 per cent is indicated for 1935. This would bring the area in potatoes back to the 1933 level. The main reductions are in the Maritimes and Eastern provinces. The intended area for Canada in 1935 is 524,500, compared with 569,200 acres planted in 1934. (May 14).—JOHN TUCKER.

POTATO MEETINGS

June 20—Onley, Virginia, Potato Field Day.

July 6—Marietta, Ohio. Field Day, Washington County Truck Crop Station.

July 13—McGuffey, Ohio. Field Day, Truck Crops Experiment Farm.

July 26—Amherst, Mass. Potato Field Day, Massachusetts State College.

August 8—Camillus, New York. Empire State Potato Club Field Day.

August 15—Wooster, Ohio. Potato Day, Experiment Station, Wooster, Ohio.

August 15—Avon, Colorado. Farmers' Field Day, Mountain Vegetable Sub-station.

November 5-8—North Judson, Indiana. Sixth Annual Truck Crops Show.

13.6% More Yield

BY TREATING SEED POTATOES THIS WAY . . .

Dip-treat seed potatoes with *New Improved* SEMESAN BEL this season and look forward to a bigger yield of better potatoes—at less cost!

Actual cost of treatment with *New Improved* SEMESAN BEL is about 21c an acre, for one pound treats 60 to 80 bushels of seed. For this slight investment, this fast dip gives better stands; reduces or prevents losses from seed-borne scab and Rhizoctonia; increases and improves the yield. In actual field tests with *New Improved* SEMESAN BEL, potato yields have been increased an average of 13.6%.

For Free Potato Pamphlet 39-F write to Bayer-Semesan Co., Inc., Wilmington, Delaware.

TREAT SEED EVERY YEAR—IT PAYS

WHITEROCK

A Big Hit

The Favorite Spray Lime and Agricultural Lime of Discriminating Growers

FIVE REASONS

WHITEROCK Superfine Pulverized Limestone
WHITEROCK Lump Spray Lime
WHITEROCK Pebble Spray Lime
WHITEROCK Super-hydrated Spray Lime
NITTANY Agricultural Hydrated Lime

WHITEROCK QUARRIES

BELLEFONTE, PA.

American Potato Journal

PUBLISHED BY

THE POTATO ASSOCIATION OF AMERICA

SOMERVILLE, N. J. NEW BRUNSWICK, N. J.

ADJUSTMENTS WITHIN THE INDUSTRY

As we consider ways and means of improving the potato industry we must appreciate that no plan can possibly be developed which everyone will support. It is apparent for example that, while many growers favor government regulation of the industry, a considerable number are opposed. It is not our purpose to consider the advantages or disadvantages of the proposed plan. It suffices to say that it was formulated as the result of the honest conviction on the part of many interested in the industry that there was need for immediate action. It may safely be said also that many who opposed this particular plan are agreed that something should be done to improve conditions.

This matter should receive the consideration of all interested in the potato crop since, if by any chance, this should be a year of low prices there will be a stronger demand than ever for some form of regulation. We must be prepared for this. The possibilities of improving the industry have not been exhausted. Some thought should be given, for example, to the advisability of improving marketing methods. There seems to be little question that the present system of marketing the crop in some of the potato growing centers could be improved. We need ask ourselves the following questions: Will better grading increase returns to the grower? Are there too many marketing agencies? Is the grower paying too much to have his crop sold? Can the spread between the grower and the consumer be decreased? How can unnecessary price cutting be avoided? These are all pertinent questions which are well worth our consideration. There is reason to believe that certain adjustments along these lines would result in increased returns to the grower without unreasonably increasing the price to the consumer. There are other ways by which the industry could be improved and all possibilities should be carefully weighed. Regulation from within and by the industry would unquestionably have the support of all concerned.